

A typical oscillator frequency band plan for the Scientific Atlanta interdiction system is shown below.

Band	Frequency Range
B	126 to 169.5 MHz

Costs (probable cash outflows)

Interdiction housings
Interdiction modules
Housing installation
Module installation
Spare modules
Power supplies
Power supply installation
Power consumption
Lost decoder rental revenue
Lost remote control revenue
Module repair cost
Module replacement truck rolls
Interdiction control computer

Benefits (probable cash inflows)

Increased basic penetration
Increased enhanced basic penetration
Increased pay penetration
Increased PPV buys
"Instant" installation revenue
Decreased installation truck rolls
Decreased disconnect truck rolls
Decreased pay churn truck rolls
Decreased decoder repair expense
Decreased decoder trouble calls/truck rolls
Decoder replacement foregone
New decoder purchase avoided

The characteristics of the "average system" used in the analysis are a composite of U.S. cable systems taken from "Cable Television Developments", October, 1992, published by the National Cable Television Association. The number of subscribers in year 0 was determined by totaling subscribers in systems with 5000 or more subscribers (probable deployers of addressable technology) and dividing by the total number of systems with 5000 or more subscribers. The cost and benefit assumptions listed in the attached analyses, were gathered from interdiction suppliers and from the experiences of cable operators who have installed interdiction systems.

Industry experience with interdiction has shown that many customers continue to require set top converters at either primary or secondary TV sets to provide remote control and extended channel tuning or to overcome limitations in TV or VCR shielding. In fact, Warner Cable of Williamsburg, VA recovered relatively few converters after installing interdiction equipment to serve approximately 200 homes in 1990. As a result, decreases in truck rolls to replace failed converters and decreased converter repair expense are predicted to be modest in the early years.

Two versions of the discounted cashflow analysis are included in the appendix. The "more likely" scenario presumes that a direct broadcast service will be inaugurated in 1994. In a "less likely" scenario, DBS service will not be a factor. The results of the most likely scenario can be summarized as follows: at a 10% discount rate, net present value based upon nine years of operation is (\$2,259,564)⁶. Accumulated net cashflow does not reach \$0 within the life of the model. The investment has an additional undesirable characteristic. An interdiction project is so capital intensive that when combined with other normal capital expenditures, the project may consume a firm's borrowing capacity and leave no resources available for investment in other conditional access technologies

⁶ () means loss.

such as digital compression. The authors wish to point out that although interdiction may not be economically feasible for all systems, operators in certain markets with high housing density (e.g. multiple dwelling units) have used interdiction to advantage.

Broadband Descrambling

Multichannel Communications Sciences, Inc. of (MCSI) San Diego, California has created in its laboratories, a device which can simultaneously descramble a handful of cable television signals. All non-scrambled signals can be processed through the device unaltered in form and can be added to the descrambled signals. Such a device, located at the point of entry to a home, could provide clear signals to TV's and VCR's within the home. Unlike interdiction, broadband descrambling is a positive security means. Descramblers need to be installed only at homes of customers of scrambled services who own "cable ready" television sets and want to use their TV sets for channel selection. This is important because TeleCable Corporation's research shows that only 20-25% of subscribers object strongly to decoders and would want such a technology.

Further, MCSI claims that broadband descramblers could be mixed with existing set top descramblers which employ a sync suppression scrambling approach. MCSI is seeking funding for the development of a prototype descrambler which the company claims will simultaneously descramble up to 36 television signals. Two years of development remain before the technology can be converted into a fully tested, off-the-shelf product. Information on specifics of the technology is considered proprietary by the company. However, we have included MCSI's product literature from their comments on FCC MM Docket No. 92-266, in the appendix.

Disadvantages of the technology are that it relies solely on sync suppression scrambling if mixed with existing decoders. A cable operator using a combination of random video inversion and sync suppression scrambling would have to give up random video inversion security. Scrambling systems employing only sync suppressions have been widely defeated by "pirate" decoder manufacturers.

As with interdiction, all of the television signals are in the clear at the customer premises. A customer could provide free service to neighbors merely by installing a signal splitter in his service drop.

Additionally, 36 channels of discretionary programming control will probably not be adequate for the product's prospective life cycle of 1995 - 2003.⁷

Further, until a manufacturer develops tooled models, the cost will not be known.

⁷ Assumes funding by mid 1993, completion of product development within 2 1/2 years and an eight year service life.

The Effect of Other Provisions of the Cable Act

Section 3 of the Cable Television Consumer Protection and Competition Act of 1992 prohibits cable operators from requiring subscription to any tier other than basic service as a condition of access to video programming on a per program or per channel basis. In addition, Section 4 of the act specifies that, at the election of a local television broadcast station, a cable operator shall carry the broadcaster's signal on the "cable system channel number on which the local commercial television station is broadcast, or on the channel on which it was carried on July 19, 1985 or on the channel on which it was carried on January 1, 1992."

The effect of these additional provisions is to render impractical, those broadband security means which are inflexible in their channelization schemes.

As an example, suppose that a cable operator decided to rely on low pass filters to separate broadcast basic services and access (PEG) channels from enhanced basic services. To accomplish this, the operator must group broadcast basic and PEG signals in lower frequency channels, e.g. 2 through 13, carry enhanced basic services on channels 23 or higher and use low pass filters which block channels 23 and above (refer to Fig. 1) from reception by broadcast basic/PEG only subscribers. However, if a customer to broadcast basic/PEG desires to access a per program or per channel service which is carried on channel 23 or above, the low pass filter must be removed, leaving enhanced basic services unprotected. Similarly, if a broadcaster operating on UHF Channel 33 demands "on channel" carriage, all low pass filters must be removed and the scheme is destroyed.

As previously explained, the Scientific Atlanta interdiction system places certain restrictions on the channels which may be secured. If broadcasters select channels which fall within any of the four oscillator bands, the already scarce number of channels which may be secured is further diminished. This same restriction applies to the known means of broadband descrambling.

APPENDIX

Discounted cashflow analyses for interdiction technology

MCSI product literature

Narrow band reject filter response

DISCUSSION OF DISCOUNTED CASH FLOW MODEL:

INTERDICTION vs. ADDRESSABLE DECODERS

The financial analysis which follows, uses the discounted cash flow method to determine the net benefit or net present value which would result from an investment that converted a cable TV system's conditional access technology from addressable decoders to interdiction. The analysis is based upon relevant costs and benefits (those future costs and benefits which are different between the two alternatives) and is therefore a differential analysis of addressable converter/decoders vs. interdiction.

The analysis is divided into seven distinct parts:

- market statistics, activity levels
- rates, fees, royalties
- expected benefits, expenses of interdiction
- capital costs, depreciation
- revenue changes
- expense changes
- P & L cash flows, net present value

Two scenarios are presented. In the more likely scenario, direct broadcast satellite services will establish a foothold by year 1 of the analysis and cable penetration will remain at 63% in years 2-9. In the less likely scenario, DBS will not affect cable growth, and interdiction will provide greater improvements in basic, enhanced basic and pay penetrations.

Market Statistics, Activity Levels

Year 0 subscribers were computed by dividing total subscribers in systems with more than 5,000 subscribers, by the number of systems with 5,000 subscribers. The model used data from Cable Television Developments, October, 1992 published by NCTA. Basic cable penetration, 62%, and pay unit penetration, 78%, were derived from the same document. The percent of addressable homes, 50%, closely approximates the 49% listed in the January issue of Paul Kagan's Cable TV Technology. Other market statistics and activity levels are representative of many urban and suburban systems which use addressable decoders to secure a variety of pay and pay per view services. Thus the model is based upon the "typical" urban/suburban addressable system.

Rates, Fees, Royalties

Rates, fees and royalties are typical of urban/suburban cable systems.

Expected Benefits of Interdiction

Basic, enhanced basic and pay penetration improvements in the "no DBS" scenario are based upon data gathered from suppliers, cable operators using interdiction and judgement. Improvements in penetrations are predicted to be half as great in the "DBS" scenario.

Other expected interdiction benefits and expenses/losses are listed below:

Benefits

Increased PPV buys
"Instant" installation revenue
Decreased installation truck rolls
Decreased disconnect truck rolls
Decreased pay churn truck rolls
Decreased decoder repair expense
Decreased decoder trouble calls/truck rolls

Expenses/Losses

Increased power consumption
Lost decoder rental revenue
Lost remote control revenue
Module repair cost
Module replacement truck rolls

Experience in several interdiction systems shows that many homes continue to need converters for channel selection on primary or secondary TV sets and relatively few converters are recovered. Accordingly, no decrease in trouble calls is predicted.

Capital Costs

Predicted capital expenditures for interdiction are based upon the following costs.

Four port housing, accessories	\$200
Subscriber module	\$ 75

Anticipated volume discounts (10%) are partially offset by sales tax, shipping and handling costs (6%), resulting in predicted costs of \$191 per housing and \$72 per subscriber module. The model assumes a "port efficiency" of 2.5 homes per port, thus cost per home for the housing is $\$191 \div 2.5 = \$76/\text{home}$ passed. Interdiction modules are assumed to be installed in series with the drops for all active subscribers during years 0, 1 and 2 and are increased to 95% of homes by year 9. The majority of the year 0 capital expenditures are assumed to be incurred late in the year and are not discounted.

Replacement of 1/8 of the addressable decoders each year is avoided with interdiction as are new decoder purchases. These capital costs "foregone" are subtracted from capital outlays to compute net capital costs.

Summary

The reader not desiring detail may go directly to the section entitled "VII., P&L cash flows", for a summary of the analysis. Net present value, based upon 9 years of operation and a 10% discount factor, is (\$2,259,564) for the more likely scenario. Accumulated cash flow does not reach \$0 within the life of the model. The investment has another undesirable characteristic. An interdiction project is so capital intensive that when combined with other normal capital expenditures, the project may consume the firm's borrowing capacity and leave no resources available for investment in other conditional access technologies such as digital compression.

Discounted cash flow model - interdiction vs. addressable decoders Feb. 1993
Less likely scenario - no DBS

Market statistics, activity levels - BAU
(BAU - business as usual/address. decoders)

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Homes passed	41,420	41,834	42,253	42,675	43,102	43,533	43,968	44,408	44,852	45,300
Home growth	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Basic pen. growth (BAU)	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Basic penetration (BAU)	62.0%	63.0%	64.0%	65.0%	66.0%	67.0%	68.0%	69.0%	70.0%	71.0%
Basic subscribers (BAU)	25,680	26,356	27,042	27,739	28,447	29,167	29,898	30,641	31,396	32,163
Net new subscribers	675	675	686	697	708	720	731	743	755	767
Enhanc. basic pen. growth (BAU)	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Enhanced basic penetration (BAU)	90.0%	90.5%	91.0%	91.5%	92.0%	92.5%	93.0%	93.5%	94.0%	94.5%
Enhanced basic subscribers	23,112	23,852	24,608	25,381	26,171	26,979	27,805	28,650	29,513	30,394
Pay household, % of homes (BAU)	50.0%	49.5%	49.0%	48.5%	48.0%	47.5%	47.0%	46.5%	46.0%	45.5%
Pay household growth (BAU)	-0.50%	-0.50%	-0.50%	-0.50%	-0.50%	-0.50%	-0.50%	-0.50%	-0.50%	-0.50%
Pay units per household (BAU)	1.56	1.55	1.54	1.54	1.53	1.52	1.51	1.51	1.50	1.49
Pay unit/household growth (BAU)	-0.50%	-0.50%	-0.50%	-0.50%	-0.50%	-0.50%	-0.50%	-0.50%	-0.50%	-0.50%
Pay penetration (BAU)	78.0%	76.8%	75.7%	74.5%	73.4%	72.3%	71.1%	70.0%	68.9%	67.8%
Pay units (BAU)	20,031	20,250	20,464	20,674	20,878	21,078	21,272	21,461	21,644	21,823
PPV movie buy rate growth (BAU)	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
PPV annual movie buy rate (BAU)	180.0%	180.5%	181.0%	181.5%	182.0%	182.5%	183.0%	183.5%	184.0%	184.5%
PPV annual event buy rate (BAU)	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
% homes addressable (= pay HH%)	50.0%	49.5%	49.0%	48.5%	48.0%	47.5%	47.0%	46.5%	46.0%	45.5%
Addressable subscribers (BAU)	12,840	13,046	13,250	13,453	13,655	13,854	14,052	14,248	14,442	14,634
Non-addressable subscribers (BAU)	12,840	13,310	13,791	14,285	14,793	15,313	15,846	16,393	16,954	17,529
Add'l outlets, % of subs (BAU)	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Additional outlets (BAU)	6,420	6,589	6,760	6,935	7,112	7,292	7,475	7,660	7,849	8,041
Add'l outlets w/decoders, % of A/Os	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
Additional outlets w/decoders	4,815	4,942	5,070	5,201	5,334	5,469	5,606	5,745	5,887	6,031
Decoders in service (BAU)	17,655	17,988	18,321	18,654	18,989	19,323	19,658	19,994	20,329	20,665
Remote control rent, % of dec. (BAU)	80.0%	75.0%	70.0%	65.0%	60.0%	55.0%	50.0%	45.0%	40.0%	35.0%
Annual installs (% of subs)	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%
Annual installations	8,988	9,224	9,465	9,709	9,957	10,208	10,464	10,724	10,989	11,257
Installation backlog, days (BAU)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Truck roll % -installs (BAU)	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%
Install truck roll cost (BAU)	\$30.00	\$31.20	\$32.45	\$33.75	\$35.10	\$36.50	\$37.96	\$39.48	\$41.06	\$42.70
(Blended avg. of installs, reconnects)										
Annual disconnects (% of subs)	32.4%	32.4%	32.5%	32.5%	32.5%	32.5%	32.6%	32.6%	32.6%	32.6%

Increase in add. outlet %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Install truck roll %	70.0%	50.0%	25.0%	20.0%	15.0%	10.0%	7.5%	5.0%	5.0%	5.0%
Disconnected truck roll %	75.0%	50.0%	25.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Pay churn truck rolls	25.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Reduction of conv./dec. in service	0.0%	10.0%	12.0%	14.0%	16.0%	18.0%	20.0%	22.0%	24.0%	26.0%
Annual trouble calls (% of subs)	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%
Add'l outlets, % of subs, interdict.	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Rem. cont. rent, % of dec., interd.	65.0%	60.0%	55.0%	50.0%	45.0%	40.0%	35.0%	30.0%	25.0%	20.0%
Reduction, A/O decoder rental (units)	0	494	608	728	853	984	1,121	1,264	1,413	1,568
Interdiction module failure rate	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%
Interdiction module repair costs	\$27.00	\$27.00	\$27.00	\$27.00	\$27.00	\$27.00	\$27.00	\$27.00	\$27.00	\$27.00
Ann. power consump. costs per interdiction module	\$3.60	\$3.60	\$3.60	\$3.60	\$3.60	\$3.60	\$3.60	\$3.60	\$3.60	\$3.60

IV. Capital costs, depreciation table

Interdiction capital costs	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Construction timetable, years	2.5									
Inter. housing cost/home (2.5H/hsng.)	\$76.00	\$76.00	\$76.00	\$76.00	\$76.00	\$76.00	\$76.00	\$76.00	\$76.00	\$76.00
Inter. housing install cost/home	\$10.00	\$10.00	\$10.00	\$10.00	\$10.00	\$10.00	\$10.00	\$10.00	\$10.00	\$10.00
Interdiction module cost	\$72.00	\$72.00	\$72.00	\$72.00	\$72.00	\$72.00	\$72.00	\$72.00	\$72.00	\$72.00
Avg. inter. module install. cost	\$15.00	\$15.00	\$15.00	\$15.00	\$15.00	\$15.00	\$15.00	\$15.00	\$15.00	\$15.00
Inter. module penetration, % homes	25.0%	50.0%	67.0%	70.0%	75.0%	80.0%	85.0%	90.0%	95.0%	95.0%
Spare modules	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%
Additional power supplies (One \$400 supply per 100 homes)	414	418	423	427	431	435	440	444	449	453
Add'l power supplies purch. in yr.	207	211	4	4	4	4	4	4	4	4
Homes passed	41,420	41,834	42,253	42,675	43,102	43,533	43,968	44,408	44,852	45,300
Home growth	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Interdiction modules in service	10,355	20,917	28,309	29,873	32,326	34,826	37,373	39,967	42,609	43,035
New modules purch./instal. in year	10,355	10,562	7,392	1,563	2,454	2,500	2,547	2,594	2,642	426
Modules purchased for inventory	777	792	554	117	184	187	191	195	198	32
Total interd. modules purch. in yr	11,132	11,354	7,947	1,681	2,638	2,687	2,738	2,789	2,840	458
Capital cost, housings	\$1,211,240	\$1,211,240	\$1,211,240	\$36,337	\$36,701	\$37,068	\$37,438	\$37,813	\$38,191	\$38,573
Capital cost, modules	\$801,477	\$817,507	\$572,149	\$121,003	\$189,925	\$193,493	\$197,112	\$200,785	\$204,511	\$32,980
Module installation costs	\$155,325	\$158,431	\$110,882	\$23,450	\$36,807	\$37,499	\$38,200	\$38,912	\$39,634	\$6,391
Power supply cost	\$82,840	\$84,497	\$1,673	\$1,690	\$1,707	\$1,724	\$1,741	\$1,759	\$1,776	\$1,794
Interdiction head end computer	\$35,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Interdiction capital costs	\$2,285,882	\$2,271,674	\$1,895,943	\$182,480	\$265,140	\$269,783	\$274,492	\$279,268	\$284,113	\$79,738

Capital costs foregone

Decoder replacement sched. (BAU)	2,207	2,248	2,290	2,332	2,374	2,415	2,457	2,499	2,541	2,583
Reduction of decoders in service	0	1,799	2,198	2,612	3,038	3,478	3,932	4,399	4,879	5,373
Decoder replacement avoided	0	1,799	2,198	2,332	2,374	2,415	2,457	2,499	2,541	2,583
Recovered decoders	0	0	0	280	665	1,063	1,474	1,899	2,338	2,790
New decoder purchases (BAU)	332	332	333	334	334	335	335	335	336	336
New decoder cost	\$117	\$117	\$117	\$117	\$117	\$117	\$117	\$117	\$117	\$117
New decoder purchase costs foregone	\$0	\$0	\$0	\$32,738	\$39,098	\$39,152	\$39,198	\$39,237	\$39,267	\$39,288
Replacement cost avoided	\$0	\$210,456	\$257,223	\$272,820	\$277,707	\$282,601	\$287,501	\$292,405	\$297,314	\$302,225
Reduction in stolen decoders	\$0	\$2,105	\$2,572	\$3,056	\$3,555	\$4,069	\$4,600	\$5,146	\$5,708	\$6,286
Capital costs foregone	\$0	\$212,560	\$259,795	\$308,614	\$320,359	\$325,822	\$331,299	\$336,788	\$342,289	\$347,799
Net cash to/from capital () means savings	\$2,285,882	\$2,059,114	\$1,636,148	(\$126,133)	(\$55,219)	(\$56,039)	(\$56,807)	(\$57,520)	(\$58,176)	(\$268,061)
Depreciation table (MACRS)	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Year 0 capital expenditures	\$326,561	\$559,812	\$399,869	\$285,621	\$204,015	\$204,015	\$204,015	\$101,950	\$0	\$0
Year 1 capital expenditures	\$0	\$294,165	\$504,277	\$360,201	\$257,286	\$183,776	\$183,776	\$183,776	\$91,836	\$0
Year 2 capital expenditures	\$0	\$0	\$233,740	\$400,693	\$286,211	\$204,437	\$146,026	\$146,026	\$146,026	\$72,972
Year 3 capital expenditures	\$0	\$0	\$0	(\$18,019)	(\$30,890)	(\$22,065)	(\$15,760)	(\$11,257)	(\$11,257)	(\$11,257)

	\$25,680	\$26,619	\$27,582	\$28,571	\$29,585	\$30,625	\$31,692	\$32,786	\$33,908	\$35,058
"Instant install" revenue from inter.	\$32,804	\$35,013	\$37,362	\$39,858	\$42,511	\$45,330	\$48,325	\$51,507	\$54,888	\$58,477
Change, additional outlet revenue	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Lost decoder rental revenue	\$0	(\$23,720)	(\$29,205)	(\$34,951)	(\$40,964)	(\$47,251)	(\$53,817)	(\$60,670)	(\$67,816)	(\$75,262)
Lost remote revenue	(\$31,779)	(\$45,329)	(\$47,487)	(\$49,247)	(\$50,585)	(\$51,477)	(\$51,898)	(\$51,823)	(\$51,229)	(\$50,092)
Cash effects of revenue changes	\$185,758	\$274,673	\$524,128	\$540,650	\$558,487	\$577,720	\$598,429	\$620,699	\$644,619	\$670,281

VI. Operating expense changes () means reduction in expense	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Basic programming costs	\$2,485	\$5,221	\$10,968	\$11,521	\$12,102	\$12,711	\$13,352	\$14,025	\$14,732	\$15,474
Enhanced basic program. costs	\$9,444	\$20,035	\$42,501	\$45,075	\$47,801	\$50,687	\$53,742	\$56,977	\$60,401	\$64,025
Pay programming costs	\$25,101	\$50,912	\$103,271	\$104,740	\$106,234	\$107,752	\$109,295	\$110,863	\$112,456	\$114,075
PPV programming costs	\$37,391	\$38,757	\$40,160	\$41,599	\$43,076	\$44,591	\$46,144	\$47,737	\$49,370	\$51,044
"Instant install" prog. expense	\$7,217	\$7,703	\$8,220	\$8,769	\$9,352	\$9,973	\$10,632	\$11,332	\$12,075	\$12,865
Interdiction module repair expense	\$13,979	\$28,238	\$38,217	\$40,328	\$43,641	\$47,015	\$50,453	\$53,956	\$57,523	\$58,098
Power consumptions costs	\$37,278	\$75,302	\$101,913	\$107,541	\$116,375	\$125,375	\$134,543	\$143,881	\$153,394	\$154,928

Discounted cash flow model - interdiction vs. addressable decoders Feb. 1993
More likely scenario - DBS flattens cable growth

I. Market statistics, activity levels - BAU
(BAU - business as usual/address. decoders)

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Homes passed	41,420	41,834	42,253	42,675	43,102	43,533	43,968	44,408	44,852	45,300
Home growth	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Basic pen. growth (BAU)	1.0%	1.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Basic penetration (BAU)	62.0%	63.0%	63.0%	63.0%	63.0%	63.0%	63.0%	63.0%	63.0%	63.0%
Basic subscribers (BAU)	25,680	26,356	26,619	26,885	27,154	27,426	27,700	27,977	28,257	28,539
Net new subscribers	675	675	264	266	269	272	274	277	280	283
Enhanc. basic pen. growth (BAU)	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Enhanced basic penetration (BAU)	90.0%	90.5%	91.0%	91.5%	92.0%	92.5%	93.0%	93.5%	94.0%	94.5%
Enhanced basic subscribers	23,112	23,852	24,223	24,600	24,982	25,369	25,761	26,158	26,561	26,970
Pay household, % of homes (BAU)	50.0%	49.5%	49.0%	48.5%	48.0%	47.5%	47.0%	46.5%	46.0%	45.5%
Pay household growth (BAU)	-0.50%	-0.50%	-0.50%	-0.50%	-0.50%	-0.50%	-0.50%	-0.50%	-0.50%	-0.50%
Pay units per household (BAU)	1.56	1.55	1.54	1.54	1.53	1.52	1.51	1.51	1.50	1.49
Pay unit/household growth (BAU)	-0.50%	-0.50%	-0.50%	-0.50%	-0.50%	-0.50%	-0.50%	-0.50%	-0.50%	-0.50%
Pay penetration (BAU)	78.0%	76.8%	75.7%	74.5%	73.4%	72.3%	71.1%	70.0%	68.9%	67.8%
Pay units (BAU)	20,031	20,250	20,145	20,038	19,929	19,819	19,708	19,595	19,480	19,364
PPV movie buy rate growth (BAU)	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
PPV annual movie buy rate (BAU)	180.0%	180.5%	181.0%	181.5%	182.0%	182.5%	183.0%	183.5%	184.0%	184.5%
PPV annual event buy rate (BAU)	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
% homes addressable (= pay HH%)	50.0%	49.5%	49.0%	48.5%	48.0%	47.5%	47.0%	46.5%	46.0%	45.5%
Addressable subscribers (BAU)	12,840	13,046	13,043	13,039	13,034	13,027	13,019	13,009	12,998	12,985
Non-addressable subscribers (BAU)	12,840	13,310	13,576	13,846	14,120	14,398	14,681	14,968	15,259	15,554
Add'l outlets, % of subs (BAU)	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Additional outlets (BAU)	6,420	6,589	6,655	6,721	6,789	6,856	6,925	6,994	7,064	7,135
Add'l outlets w/decoders, % of A/Os	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
Additional outlets w/decoders	4,815	4,942	4,991	5,041	5,091	5,142	5,194	5,246	5,298	5,351
Decoders in service (BAU)	17,655	17,988	18,034	18,080	18,125	18,170	18,213	18,255	18,296	18,336
Remote control rent, % of dec. (BAU)	80.0%	75.0%	70.0%	65.0%	60.0%	55.0%	50.0%	45.0%	40.0%	35.0%
Annual installs (% of subs)	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%
Annual installations	8,988	9,224	9,317	9,410	9,504	9,599	9,695	9,792	9,890	9,989
Installation backlog, days (BAU)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Truck roll % -installs (BAU)	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%
Install truck roll cost (BAU)	\$30.00	\$31.20	\$32.45	\$33.75	\$35.10	\$36.50	\$37.96	\$39.48	\$41.06	\$42.70
(Blended avg. of installs, reconnects)										
Annual disconnects (% of subs)	32.4%	32.4%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%
Annual disconnects	8,313	8,549	9,053	9,144	9,235	9,327	9,421	9,515	9,610	9,706
Truck roll %-disconnects	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%

Disconnect truck roll cost (BAU)	\$15.00	\$15.60	\$16.22	\$16.87	\$17.55	\$18.25	\$18.98	\$19.74	\$20.53	\$21.35
Pay service changes % (of pays)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Annual pay service changes x 2 (BAU)	20,031	20,250	20,145	20,038	19,929	19,819	19,708	19,595	19,480	19,364
Truck roll % -pay changes (BAU)	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Pay change truck roll cost (BAU)	\$15.00	\$15.60	\$16.22	\$16.87	\$17.55	\$18.25	\$18.98	\$19.74	\$20.53	\$21.35
Annual trouble calls (% of subs)	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%
Truck roll % -TCs (BAU)	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
Trouble call truck roll cost	\$25.00	\$26.00	\$27.04	\$28.12	\$29.25	\$30.42	\$31.63	\$32.90	\$34.21	\$35.58
Annual decoder failure % (BAU)	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Annual decoder failures (BAU)	1,766	1,799	1,803	1,808	1,813	1,817	1,821	1,825	1,830	1,834

Increase in add. outlet %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Install truck roll %	70.0%	50.0%	25.0%	20.0%	15.0%	10.0%	7.5%	5.0%	5.0%	5.0%
Disconnect truck roll %	75.0%	50.0%	25.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Pay churn truck rolls	25.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Reduction of conv./dec. in service	0.0%	10.0%	12.0%	14.0%	16.0%	18.0%	20.0%	22.0%	24.0%	26.0%
Annual trouble calls (% of subs)	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%
Add'l outlets, % of subs, interdict.	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Rem. cont. rent, % of dec., interd.	65.0%	60.0%	55.0%	50.0%	45.0%	40.0%	35.0%	30.0%	25.0%	20.0%
Reduction, A/O decoder rental (units)	0	494	599	706	815	926	1,039	1,154	1,272	1,391
Interdiction module failure rate	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%
Interdiction module repair costs	\$27.00	\$27.00	\$27.00	\$27.00	\$27.00	\$27.00	\$27.00	\$27.00	\$27.00	\$27.00
Ann. power consump. costs per interdiction module	\$3.60	\$3.60	\$3.60	\$3.60	\$3.60	\$3.60	\$3.60	\$3.60	\$3.60	\$3.60

IV. Capital costs, depreciation table

Interdiction capital costs	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Construction timetable, years	2.5									
Inter. housing cost/home (2.5H/hsng.)	\$76.00	\$76.00	\$76.00	\$76.00	\$76.00	\$76.00	\$76.00	\$76.00	\$76.00	\$76.00
Inter. housing install cost/home	\$10.00	\$10.00	\$10.00	\$10.00	\$10.00	\$10.00	\$10.00	\$10.00	\$10.00	\$10.00
Interdiction module cost	\$72.00	\$72.00	\$72.00	\$72.00	\$72.00	\$72.00	\$72.00	\$72.00	\$72.00	\$72.00
Avg. inter. module install. cost	\$15.00	\$15.00	\$15.00	\$15.00	\$15.00	\$15.00	\$15.00	\$15.00	\$15.00	\$15.00
Inter. module penetration, % homes	25.0%	50.0%	67.0%	70.0%	75.0%	80.0%	85.0%	90.0%	95.0%	95.0%
Spare modules	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%
Additional power supplies	414	418	423	427	431	435	440	444	449	453
(One \$400 supply per 100 homes)										
Add'l power supplies purch. in yr.	207	211	4	4	4	4	4	4	4	4
Homes passed	41,420	41,834	42,253	42,675	43,102	43,533	43,968	44,408	44,852	45,300
Home growth	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Interdiction modules in service	10,355	20,917	28,309	29,873	32,326	34,826	37,373	39,967	42,609	43,035
New modules purch./instal. in year	10,355	10,562	7,392	1,563	2,454	2,500	2,547	2,594	2,642	426
Modules purchased for inventory	777	792	554	117	184	187	191	195	198	32
Total interd. modules purch. in yr	11,132	11,354	7,947	1,681	2,638	2,687	2,738	2,789	2,840	458
Capital cost, housings	\$1,211,240	\$1,211,240	\$1,211,240	\$36,337	\$36,701	\$37,068	\$37,438	\$37,813	\$38,191	\$38,573
Capital cost, modules	\$801,477	\$817,507	\$572,149	\$121,003	\$189,925	\$193,493	\$197,112	\$200,785	\$204,511	\$32,980
Module installation costs	\$155,325	\$158,431	\$110,882	\$23,450	\$36,807	\$37,499	\$38,200	\$38,912	\$39,634	\$6,391
Power supply cost	\$82,840	\$84,497	\$1,673	\$1,690	\$1,707	\$1,724	\$1,741	\$1,759	\$1,776	\$1,794
Interdiction head end computer	\$35,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Interdiction capital costs	\$2,285,882	\$2,271,674	\$1,895,943	\$182,480	\$265,140	\$269,783	\$274,492	\$279,268	\$284,113	\$79,738

Capital costs foregone

Decoder replacement sched. (BAU)	2,207	2,248	2,254	2,260	2,266	2,271	2,277	2,282	2,287	2,292
Reduction of decoders in service	0	1,799	2,164	2,531	2,900	3,271	3,643	4,016	4,391	4,767
Decoder replacement avoided	0	1,799	2,164	2,260	2,266	2,271	2,277	2,282	2,287	2,292
Recovered decoders	0	0	0	271	634	999	1,366	1,734	2,104	2,475
New decoder purchases (BAU)	332	332	47	46	45	44	43	42	41	40
New decoder cost	\$117	\$117	\$117	\$117	\$117	\$117	\$117	\$117	\$117	\$117
New decoder purchase costs foregone	\$0	\$0	\$0	\$5,372	\$5,269	\$5,163	\$5,054	\$4,942	\$4,828	\$4,711
Replacement cost avoided	\$0	\$210,456	\$253,204	\$264,425	\$265,084	\$265,729	\$266,361	\$266,979	\$267,582	\$268,171
Reduction in stolen decoders	\$0	\$2,105	\$2,532	\$2,962	\$3,393	\$3,827	\$4,262	\$4,699	\$5,138	\$5,578

Capital costs foregone \$0 \$212,560 \$255,736 \$272,759 \$273,746 \$274,718 \$275,677 \$276,620 \$277,548 \$278,460

Net cash to/from capital \$2,285,882 \$2,059,114 \$1,640,208 (\$90,279) (\$8,606) (\$4,935) (\$1,185) \$2,648 \$6,565 (\$198,722)
() means savings

Depreciation table (MACRS)	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Year 0 capital expenditures	\$326,561	\$559,812	\$399,869	\$285,621	\$204,015	\$204,015	\$204,015	\$101,950	\$0	\$0
Year 1 capital expenditures	\$0	\$294,165	\$504,277	\$360,201	\$257,286	\$183,776	\$183,776	\$183,776	\$91,836	\$0
Year 2 capital expenditures	\$0	\$0	\$234,320	\$401,687	\$286,922	\$204,944	\$146,389	\$146,389	\$146,389	\$73,153
Year 3 capital expenditures	\$0	\$0	\$0	(\$12,897)	(\$22,109)	(\$15,792)	(\$11,280)	(\$8,057)	(\$8,057)	(\$8,057)
Year 4 capital expenditures	\$0	\$0	\$0	\$0	(\$1,229)	(\$2,108)	(\$1,505)	(\$1,075)	(\$768)	(\$768)
Year 5 capital expenditures	\$0	\$0	\$0	\$0	\$0	(\$705)	(\$1,209)	(\$863)	(\$617)	(\$440)
Year 6 capital expenditures	\$0	\$0	\$0	\$0	\$0	\$0	(\$169)	(\$290)	(\$207)	(\$148)
Year 7 capital expenditures	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$378	\$649	\$463
Year 8 capital expenditures	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$938	\$1,608
Year 9 capital expenditures	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	(\$28,389)
Sum, depreciation expenses	\$326,561	\$853,977	\$1,138,466	\$1,034,611	\$724,884	\$574,130	\$520,016	\$422,207	\$230,162	\$37,421

V. Revenue changes

() means reduction in revenue

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Additional basic subs from interd.	124	209	423	427	431	435	440	444	449	453
Total basic subscribers, interdiction	25,805	26,565	27,042	27,312	27,585	27,861	28,140	28,421	28,705	28,992
Additional basic revenue/yr.	\$14,911	\$26,105	\$54,840	\$57,604	\$60,508	\$63,557	\$66,761	\$70,125	\$73,660	\$77,372
Add'l enhanced basic subs from inter.	189	321	651	659	668	677	686	695	704	713
Additional enhanced basic rev./yr.	\$22,665	\$40,070	\$84,454	\$88,999	\$93,787	\$98,831	\$104,146	\$109,746	\$115,645	\$121,861
Additional pay units from interd.	225	424	852	856	859	863	867	871	874	878
Additional pay revenue/yr.	\$27,039	\$50,912	\$102,257	\$102,692	\$103,131	\$103,573	\$104,019	\$104,468	\$104,921	\$105,377
Additional PPV movie buys from inter.	11,556	11,979	12,218	12,461	12,708	12,959	13,213	13,471	13,733	13,999
Additional PPV movie revenue	\$46,225	\$47,914	\$48,873	\$49,845	\$50,833	\$51,835	\$52,851	\$53,884	\$54,931	\$55,994
Additional PPV event buys from inter.	1,284	1,331	1,358	1,385	1,412	1,440	1,468	1,497	1,526	1,555

	\$25,680	\$26,619	\$27,151	\$27,692	\$28,240	\$28,797	\$29,362	\$29,935	\$30,517	\$31,108
"Instant install" revenue from inter.	\$32,804	\$35,013	\$36,778	\$38,632	\$40,579	\$42,624	\$44,772	\$47,029	\$49,399	\$51,888
Change, additional outlet revenue	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Lost decoder rental revenue	\$0	(\$23,720)	(\$28,749)	(\$33,875)	(\$39,102)	(\$44,430)	(\$49,860)	(\$55,394)	(\$61,034)	(\$66,782)
Lost remote revenue	(\$31,779)	(\$45,329)	(\$46,745)	(\$47,732)	(\$48,286)	(\$48,404)	(\$48,082)	(\$47,317)	(\$46,106)	(\$44,448)

Cash effects of revenue changes	\$137,545	\$157,585	\$278,860	\$283,856	\$289,689	\$296,384	\$303,970	\$312,475	\$321,932	\$332,371
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VI. Operating expense changes () means reduction in expense	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
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Basic programming costs	\$1,491	\$2,610	\$5,484	\$5,760	\$6,051	\$6,356	\$6,676	\$7,013	\$7,366	\$7,737
Enhanced basic program. costs	\$5,666	\$10,018	\$21,114	\$22,250	\$23,447	\$24,708	\$26,037	\$27,436	\$28,911	\$30,465
Pay programming costs	\$13,519	\$25,456	\$51,128	\$51,346	\$51,565	\$51,786	\$52,009	\$52,234	\$52,460	\$52,689
PPV programming costs	\$37,391	\$38,757	\$39,533	\$40,319	\$41,118	\$41,928	\$42,751	\$43,586	\$44,433	\$45,293
"Instant install" prog. expense	\$7,217	\$7,703	\$8,091	\$8,499	\$8,927	\$9,377	\$9,850	\$10,346	\$10,868	\$11,415
Interdiction module repair expense	\$13,979	\$28,238	\$38,217	\$40,328	\$43,641	\$47,015	\$50,453	\$53,956	\$57,523	\$58,098
Power consumptions costs	\$37,278	\$75,302	\$101,913	\$107,541	\$116,375	\$125,375	\$134,543	\$143,881	\$153,394	\$154,928

Reduced install. truck rolls	\$0	(\$57,561)	(\$136,039)	(\$158,772)	(\$183,452)	(\$210,216)	(\$230,011)	(\$251,267)	(\$263,931)	(\$277,234)
Reduced disconnect truck rolls	(\$12,469)	(\$46,679)	(\$88,127)	(\$131,139)	(\$137,748)	(\$144,690)	(\$151,983)	(\$159,643)	(\$167,689)	(\$176,140)
Reduced pay change truck rolls	\$0	(\$39,487)	(\$81,707)	(\$84,524)	(\$87,430)	(\$90,425)	(\$93,513)	(\$96,695)	(\$99,974)	(\$103,352)
Reduced trouble call truck rolls	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Reduced decoder repair costs	\$0	(\$5,051)	(\$6,320)	(\$7,688)	(\$9,160)	(\$10,744)	(\$12,444)	(\$14,269)	(\$16,226)	(\$18,321)

Cash effects of op. exp. changes	\$104,072	\$39,306	(\$46,712)	(\$106,079)	(\$126,666)	(\$149,529)	(\$165,632)	(\$183,422)	(\$192,865)	(\$214,422)
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VII. P & L cash flows	Year	0	1	2	3	4	5	6	7	8	9
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Revenue changes (from V.)	\$137,545	\$157,585	\$278,860	\$283,856	\$289,689	\$296,384	\$303,970	\$312,475	\$321,932	\$332,371
Expense changes (from VI.)	\$104,072	\$39,306	(\$46,712)	(\$106,079)	(\$126,666)	(\$149,529)	(\$165,632)	(\$183,422)	(\$192,865)	(\$214,422)

Operating income changes	\$33,473	\$118,279	\$325,571	\$389,935	\$416,355	\$445,913	\$469,601	\$495,898	\$514,797	\$546,793
MACRS depreciation (from IV.)	\$326,561	\$853,977	\$1,138,466	\$1,034,611	\$724,884	\$574,130	\$520,016	\$422,207	\$230,162	\$37,421
Taxable income	(\$293,088)	(\$735,698)	(\$812,895)	(\$644,676)	(\$308,530)	(\$128,217)	(\$50,414)	\$73,691	\$284,635	\$509,372
Tax (41%)	(\$120,166)	(\$301,636)	(\$333,287)	(\$264,317)	(\$126,497)	(\$52,569)	(\$20,670)	\$30,213	\$116,700	\$208,843
Net income after tax	(\$172,922)	(\$434,062)	(\$479,608)	(\$380,359)	(\$182,032)	(\$75,648)	(\$29,744)	\$43,478	\$167,935	\$300,530

Cash flow (net income + deprec.)	\$153,639	\$419,915	\$658,858	\$654,253	\$542,852	\$498,482	\$490,271	\$465,685	\$398,097	\$337,950
Capital expenditures	\$2,285,882	\$2,059,114	\$1,640,208	(\$90,279)	(\$8,606)	(\$4,935)	(\$1,185)	\$2,648	\$6,565	(\$198,722)
Net cash flows	(\$2,132,243)	(\$1,639,199)	(\$981,349)	\$744,531	\$551,457	\$503,417	\$491,456	\$463,036	\$391,532	\$536,673

Discontinued cash flows

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2 BROADBAND DESCRAMBLING TECHNOLOGY

MCSI has developed and demonstrated a proprietary technology for controlling the simultaneous access and descrambling of many scrambled TV channels on a CATV system. This technology enables a CATV system operator to eliminate the need for any set-top descramblers in subscribers homes and thus facilitates the subscriber's use of all cable ready features purchased with today's television receivers and VCR's, including additional TV outlet service for all authorized channels. All this is done while preserving a scrambled signal distribution on the cable plant on the one hand, and by supplying a broadband signal to the home in which all authorized channels are simultaneously descrambled and provided in the clear at every TV outlet in the home.

Because the MCSI technology is based on digital broadband RF signal processing techniques, it can simultaneously descramble a number of channels, while at the same time process other selected channels to further deny clear access. While this processing is being

accomplished with all the resultant benefits discussed below.

Because of its compatibility and ability to coexist with today's set-top converter/descramblers, MCSI technology can be implemented initially without changes to the existing headend addressable scramblers, controllers or their software. Thus, without the need of cable system upgrades, the MCSI approach will offer operators a much more attractive alternative for subscriber friendly access control systems than such cost intensive systems as Interdiction, or inflexible approaches as addressable traps being offered by some vendors.

Unlike set-top descramblers used today, the MCSI broadband descramblers introduce virtually no artifacts or distortion in either the audio or video signals on descrambled and non-blocked channels. Therefore, video and audio quality is significantly improved with respect to current set-top devices, and functions such as MTS stereo are fully retained without loss of performance associated with today's set-top descrambler degradations.

2.2 Transition to Proprietary Enhanced Scrambling

The MCSI system will offer cable system operators the ability to migrate to a new enhanced security multichannel video scrambling method developed by MCSI. This proprietary headend-originated security scheme will provide the enhanced security needed for pay-per-view and pay services for which current scrambling methods have been compromised by pirate decoders. Migration to MCSI's new enhanced security system may be accomplished on a channel by channel basis beginning with any channel for which all authorized subscribers are served by an installed MCSI access control device. This headend originated scrambling method will allow early and economic migration to the enhanced security mode in lower penetration, but high revenue producing, pay services.

2.3 Number of Processed Channels

MCSI employs a proprietary wide band digital spectral processing system which provides for separate and independent signal processing functions in each 6 MHz CATV channel within preselected channel groups. Because the Company's signal processing functions can be implemented over the entire CATV channel range, the incremental cost of increasing the number of controlled channels is quite low. When the MCSI technology is implemented in a limited number of custom VLSI chips the number of individually controlled channels can economically reach 72 or more.

MCSI's first product will provide for 36 channel processing capability, with pass-through transparency for all other non-processed channels up to 550 MHz or 750 MHz. Through the use of a plug-in expansion module, an additional 36 channels can be processed, providing a total of 72 individually and simultaneously controlled channels. The MCSI subscriber device operates on remotely configurable groups of individually controlled contiguous channels, and does not disturb signals on other (unprocessed) channels. The MCSI hardware design is compatible with digital transmission and also allows for future compressed NTSC or HDTV signals.

2.4 Additional Tiering Security by Signal Denial Processing

The MCSI subscriber devices can accomplish further video and/or audio denial of unauthorized channels, thereby providing additional security in subscriber locations in which they are installed. This approach instantly renders obsolete existing "pirate boxes" operating on scrambled channels. This feature may be used to deny access not only to head-end originated scrambled channels, but also to clear channels that may be a part of an expanded basic tier that has high penetration. In this way, DBD devices can be installed initially only in subscriber locations which require the pay scrambled tiers or only the bare basic tier, thereby providing denial of the expanded basic clear channels and providing access control to higher pay tiers without buy-through constraints. An example of such arrangement is shown in Figure 3. Thus, cost effective tiering can be accomplished without scrambling any of the basic channels. It becomes clear that DBD devices **simultaneously** provide positive security on some channels and negative security on other channels, as configured by addressable control from the headend.

In addition to addressable channel tiering capability, each subscriber module is equipped with an addressable control enabling connect/disconnect capability. This feature allows for the elimination of truck rolls for service disconnects and reconnects.

2.5 On Screen Display Capability

Another feature of the MCSI system is an optional provision for On-Screen Display (OSD) text insertion capability within the subscriber module that can be individually controlled on an addressable basis from the headend. This addressable OSD option can be used for downloadable addressable textual messages inserted on selected channels for billing or disconnect messages, or diagnostic applications.

2.6 Projected Cost

The MCSI system makes use of certain digital signal processing chips that have recently been developed for personal computers and digital cellular telephony. Thus, tremendous cost and time advantages can be gained, since these complex chips are already developed and are in high volume production and readily available at low cost.

MCSI's products are projected to be priced at an average of \$140 per addressable subscriber - roughly the amount a cable operator now invests on an addressable subscriber (1.3 sets/sub). Cost reductions achieved through economies of scale inherent in larger volume production, and learning curve experience, will enable the costs of DBD devices per addressable subscriber to be even less than today's single channel descrambling technology.

2.7 Product Configurations

Two product configurations have been considered. The first device is a Single Family dwelling Unit (SFU) that is mounted on the side of the home and powered from the subscriber

premises. The second configuration is designed to serve subscribers in Multiple Dwelling Unit (MDU) housing including apartments, condominiums, and mobile home parks, as well as pole and pedestal mounts for which multiple DBD subscriber devices can share a common enclosure. The advantages of providing an MDU product configuration are derived from the lower electronics and installation costs per subscriber due to the sharing of electronics and the secure enclosure.

The systems designed for Baseband Sync suppression compatibility and those designed for RF Sync suppression compatibility are designed such that when configured for MCSI's enhanced scrambling, their operation is identical and they may coexist on one cable system utilizing the MCSI enhanced scrambling mode.

2.8 Pay-per-view (PPV) and IPPV

Because the first version of MCSI's subscriber units would be compatible with existing scrambling systems, they can be addressed through the exiting ANI an ARU IPPV system, thereby offering these capabilities to subscribers equipped with DBD devices. Similarly, cable system employing CSR's for reservation PPV will be able to address the DBD units as usual.

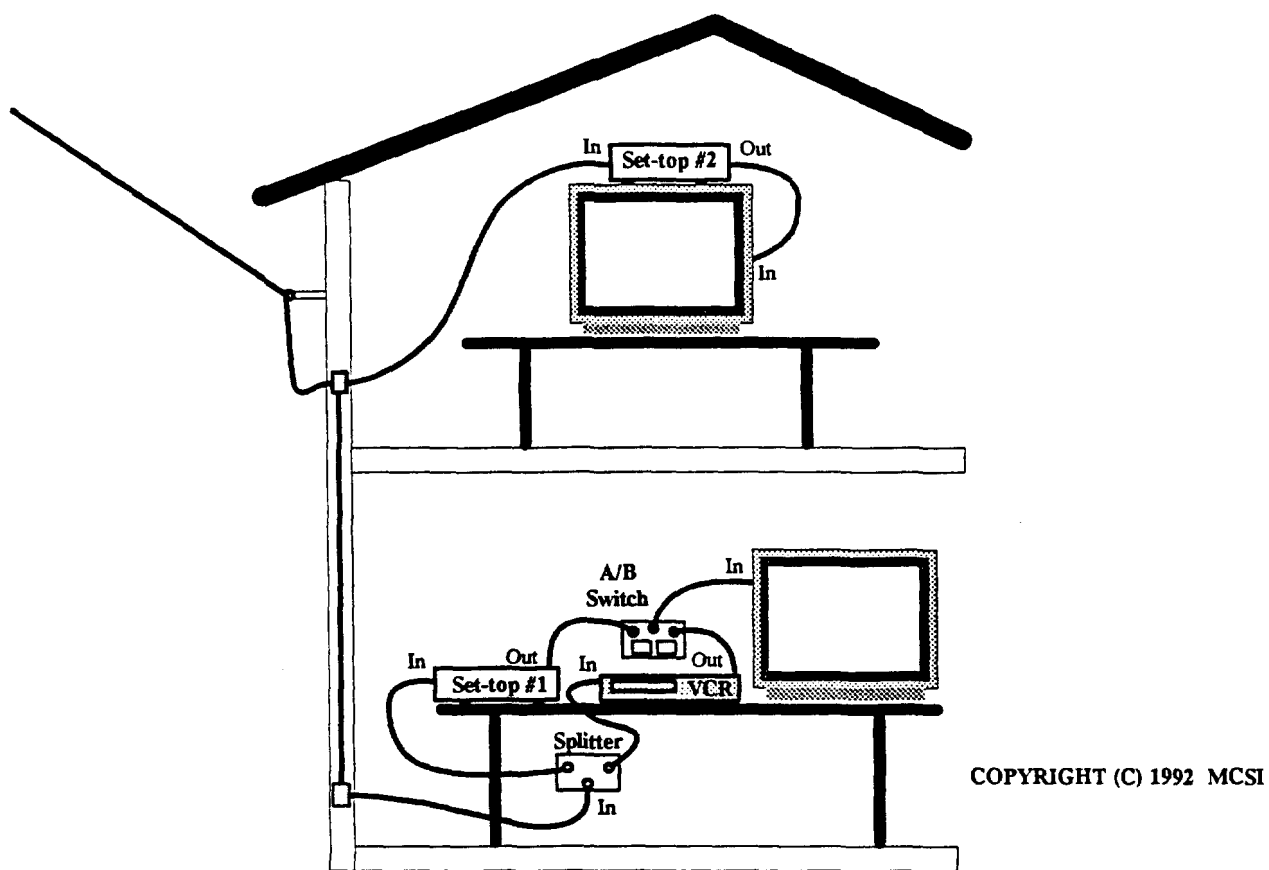


Figure 1 (a). Typical cable hook-up with conventional set-top descramblers

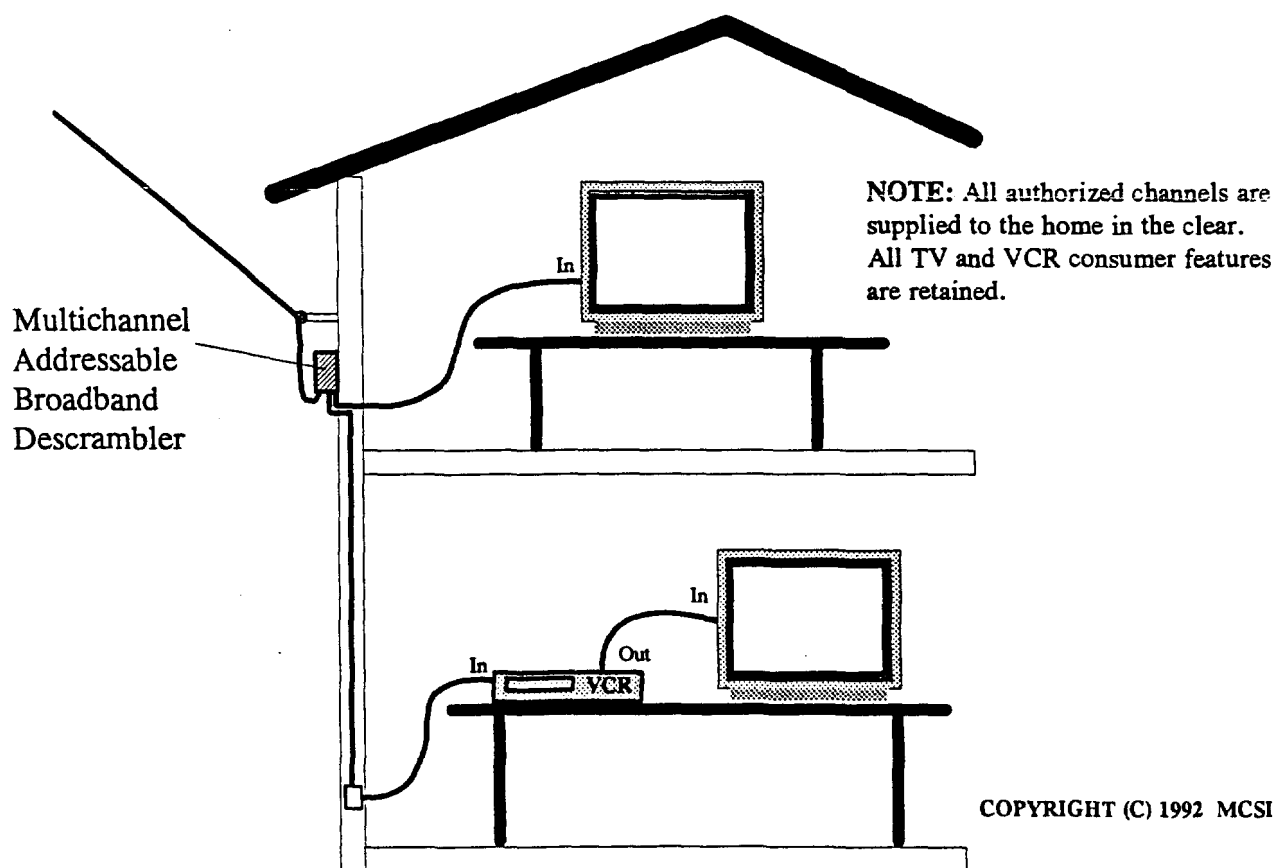


Figure 1 (b). Cable hook-up with Point of Entry multichannel Broadband Descrambler